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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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TOWNSEND AND TOWNSEND AND CREW, LLP
TWO EMBARCADERO CENTER
EIGHTH FLOOR
SAN FRANCISCO, CA 94111-3834

EXAMINER	
XU, KEVIN K	
ART UNIT	**PAPER NUMBER**
2676	

DATE MAILED: 03/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/796,222	WANG ET AL.
	Examiner	**Art Unit**
	Kevin K. Xu	2676

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-10 and 12-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☒ Claim(s) *4-6 and 8-10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/796,222.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see Remarks, filed 2/2/2006, with respect to certain objections and rejections have been fully considered and are persuasive. See Below.

The objection to the drawings has been withdrawn in view of applicant's amendments.

Applicant's arguments, see Remarks, filed 2/2/2006, with respect to the rejection of claim 2 under 35 U.S.C. 102 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Matsumoto (6356272) in further view of Geng. (2003/0123713) It should be noted that applicant's argument regarding "transforming a generic model into a shape of similar appearance of the inputted mesh" is only implied with respect to claim 2 and no explicit wording or inherent implication of a generic model is signified with respect to claims 1 and 3, as the applicant has proposed. Thus, the examiner will consider the applicant's argument under new grounds of rejection with respect to only claim 2.

Applicant's arguments see Remarks, filed 2/2/2006 with respect to claims 4-6 have been fully considered and are persuasive. The rejection of claims 4-6 under 35 U.S.C. 102 has been withdrawn.

Applicant's arguments see Remarks, filed 2/2/2006 with respect to claims 8-10 have been fully considered and are persuasive. The rejection of claims 8-10 under 35 U.S.C. 102 has been withdrawn. It should be noted that although claim 6, as proposed

by the applicant, recites a color-averaging variable, there is no explicit recitation of an equation for color averaging as recited in claims 8-10. Therefore, the examiner is only withdrawing the rejection of 35 U.S.C. 102 with respect to claims 8-10.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., requirement for the distance to be used as a weight for color blending) is not recited in the rejected claims 12-16. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Specification

The disclosure is objected to because of the following informalities: page 10 of the specification discloses the equation of color adjustment to be Ai = (Ai,1 * Wi,1 +...Ai,i-1*Wi, i-1)/(Wi,1+...+Wi,i-1). However claims 8-10 recite the equation of color adjustment to be Ai = (Ai,1 * Wi,1 + ...Ai,Ai-1* Wi * Wi-1)/(Wi,1+...+Wi,i-1). Consequently, this would render the claims somewhat nebulous because the claimed equation differs from the equation disclosed in the specification and therefore appropriate correction is required.

Claim Objections

Claims 4-6 and 8-10 and 15, 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsumoto (6,356,272).

Regarding claim 1, Matsumoto teaches the making of a colorful three dimensional model comprising of inputting three-dimensional original measured data by explaining image data to be obtained by shooting the object of interest (Fig. 3, item 100) from a plurality of viewpoints with camera (Fig 3, item 120) carried by an operator moving around stationary object (Fig. 3, item 100). By identifying the position of camera (Fig 3, item 120) and the shooting direction for each shot of an image three dimensional shape model can be reconstructed (Fig 6D, item 300). This is a method of capturing image data to be inputted for reconstruction. (Col 16, lines 49-62) Matsumoto additionally teaches the making of a colorful three-dimensional model comprising of reconstructing mesh models with regular data by presenting FIG. 3 as a schematic block diagram showing a structure of a three-dimensional model generation apparatus (Fig. 3) to reconstruct a three-dimensional model from an actual object according to a first embodiment of the present invention. Referring to FIG. 3, an object of interest 100 is mounted on a turntable 110. Turntable 110 has its angle of rotation controlled

according to, for example, a control signal from a computer 130. A camera 120 shoots the rotating object of interest 100 at every specified angle. The obtained image data is applied to computer 130. Data of the shooting condition such as the rotary pitch of turntable 110 and the like is applied to computer 130 from an input device 140. (Col. 15, lines 33-43) Matsumoto also teaches making a colorful three-dimensional model comprising of abstracting color information by showing the case of picking up a total of n images by rotating an object of interest for every predetermined angle of rotation, as shown in FIG. 1. In this case, each image information corresponds to the label number of 1, 2, 3 . . . , n. The object of interest is represented as a shape model (wire frame model) 300 using a polygon (triangular patch). When texture information is to be assigned to shape model 300, color information (texture information) of the image information of a corresponding label number is assigned for each triangular patch according to the direction of the camera shooting the object of interest. (Col 2, lines 11-21) Matsumoto further teaches making a colorful three-dimensional model comprising of harmonizing color of texture images by showing the applying of color information (texture information) obtained from reference image information that has the greatest amount of texture information is assigned to each three-dimensional shape constituent element (polygon 27, figure 6D) forming shape model 300. (figure, 6D) (Col 19, line 21 – Col 22, line 5) Matsumoto further teaches making a colorful three-dimensional model comprising of pixel blending to overlapped texture images between the mesh models. As to a purpose for blending, Matsumoto teaches the central projection system is disadvantageous in that the joint of the texture

is noticeable when the gloss or the texture of the color information is slightly different due to the illumination and the like since the texture information is assigned from different image information (image information of a different label number) to a three-dimensional shape constituent element that is not present within the same range of rotation angle when viewed from the axis of rotation. (Col 2, line 44-52); said means for assigning texture information to a three-dimensional shape constituent element by carrying out a **weighted mean process** according to the area of a three-dimensional shape constituent element projected on each object image information on the basis of object image information corresponding to the related label number and the object image information corresponding to a predetermined number of label numbers including that related label number. (Col 7, lines 24-32); said according to a still further aspect of the present invention, a texture information assignment apparatus for a shape model includes: means for capturing a plurality of object images information by shooting an object of interest from different viewpoints; means for describing the shape of the object of interest as a shape model by a set of a plurality of three-dimensional shape constituent elements; and means for assigning texture information obtained by carrying out a **weighted mean process** for all the object image information according to the area corresponding to the three-dimensional shape constituent element projected on the plurality of object images information for every three-dimensional shape constituent element. Preferably, the means for assigning texture information to the three-dimensional shape constituent element obtains the area projected on the object image information for each three-dimensional shape constituent element, and

uses the obtained area as the weighting factor in carrying out the **weighted mean process**. For the texture information of the three-dimensional shape constituent element, the portion of the three-dimensional shape constituent element projected on the object image information is obtained. The image information (color, density or luminance) of this projected portion is subjected to a weighted means process to result in the texture information. (Col 8, lines 24- 46). Therefore claim 1 is anticipated by Matsumoto.

Regarding claim 3, Matsumoto teaches the method, wherein the color abstracting step is to establish texture-mapping relationship between two dimensional image of the original measure data and the generic model, which comprises seeking mapping points of mesh points of the generic model on the original measured data and triangles having the mapping points by showing at step S16 (texture mapping, Fig 5), a plurality of three-dimensional shape constituent elements (for example, **a polygon such as a triangular patch**; for the sake of simplification, the three-dimensional shape constituent element is represented as a polygon hereinafter) 27 (Fig. 11) on the basis of the three-dimensional shape of target object 100 obtained at step S14. The three-dimensional shape of target object 100 obtained at step S14 is represented by a plurality of polygons 27 (Col 40, lines 14-19); said calculating corresponding texture coordinates of the mapping points by showing the amount of texture information is determined according to the degree of match between the normal vector of each three-dimensional shape constituent element (polygon 27) and the normal vector of the image shooting plane parallel to the direction in which the reference image was shot.

More specifically, the reference image that is most positively opposite the relevant polygon 27 is selected as the reference image having the greatest texture information with respect to that polygon 27 (Col 20, lines 26-34) ; said checking continuity of the triangles on the texture images by the weighted mean process of texture information from a predetermined number of reference image information, texture information for a corresponding polygon can be obtained. Therefore, texture information improved in texture continuity can be assigned to the relevant polygon. (Col 28 lines 49-55) Therefore claim 3 is anticipated by Matsumoto.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto (6356272) in view of Geng (2003/0123713)

Regarding claim 2, Matsumoto fails to explicitly teach a generic model. This is what Geng teaches. (p. 4 paragraph 57, p. 6 paragraph 85, p. 7 paragraph 96 and paragraph 102) It would have been obvious to one of ordinary skill in the art at the present time the invention was made to combine the teachings of a generic model as taught by Geng into the system of Matsumoto in order to deform the generic model data to be close to the original measured data because the generic face model as taught by

Geng provides an efficient computation structure to represent face shape and deformation properties (p. 9 paragraph 128). It should be noted that Geng does not explicitly teach adjusting dimension and spatial position of the generic model. However Geng teaches a three-dimensional generic model deformation wherein one can morph the fiducial points and neighboring regions on the generic model in order to match with the two-dimensional image (original data) (p. 7, paragraph 96). It would have been obvious to one or ordinary skill in the art at the present time the invention was made to utilize adjusting dimension and spatial position of the generic model in order to overlap with the measured data in the deformation process of Geng in order to provide a greater number of sample points to be selected and thus, a more accurate fitting of the three-dimensional face model can be achieved. (p. 7, paragraphs 101 and 102)

Claims 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto (6,356,272) in view of Migdal (6,356,263)

In regard to claim 12, Matsumoto teaches a means for assigning texture information to a three-dimensional shape constituent element by carrying out a weighted mean process according to the area of a three-dimensional shape constituent element projected on each object image information on the basis of object image information corresponding to the related label number and the object image information corresponding to a predetermined number of label numbers including that related label number. (Col 7, lines 24-32) Although Matsumoto does not explicitly suggest seeking overlapped images covered by each triangle within overlapped areas for pixel blending, it would have been obvious to one of ordinary skill in the art at the time the present

invention was made to utilize the texture processing of Matsumoto for the pixel blending as claimed because texture processing requires seeking of overlapped images covered by each triangle within overlapped areas. Matsumoto further teaches the image information (color, density or luminance) of this a projected portion is subjected to a weighted mean process to result in the texture information. (Col 7, lines 45-47) Further, Matsumoto teaches the means for assigning texture information to the three-dimensional shape constituent element obtains the area projected on the object image information for each three-dimensional shape constituent element, and uses the obtained area as the weighting factor in carrying out the weighted mean process. For the texture information of the three-dimensional shape constituent element, the portion of the three-dimensional shape constituent element projected on the object image information is obtained. The image information (color, density or luminance) of this projected portion is subjected to a weighted means process to result in the texture information. (Col 8, lines 36-47) Although Matsumoto does not explicitly teach calculating pixel weight average to mapping area corresponding to each triangle, it would have been obvious to one of ordinary skill in the art at the time the present invention was made to utilize the method as claimed in Matsumoto because using an amount of image area obtained as a weighting factor in the averaging process would also be applied for calculating pixel weight average to mapping area. Lastly Matsumoto fails to explicitly teach calculating distances of vertices of each of the triangles within the overlapped areas to nearest edges of corresponding mesh. However, this is what Migdal (6,356,263) teaches. Migdal teaches non-symmetric

criteria included using a distance function that would calculate a distance from one of the vertices. (Col 7, lines 30-34). Furthermore, Migdal teaches a procedure that determines whether the square of the distance between the vertices' coordinates of the edge to be subdivided is greater than a threshold value. (Col 7, lines 55-58). It would have been obvious to one of ordinary skill in the art at the time the present invention was made to combine the teachings of distance calculation between a vertex and an edge of a triangle taught by Migdal into a pixel blending technique using weighted average taught by Matsumoto because the use of the distance function taught by Migdal provides computational and processing efficiencies such as saving of memory space and processor resources. (Col 8, lines 8-10) and by calculating these distances a more accurate 3-D model would be realized.

Claim 14 is similar in scope to claim 12 and thus rejected under similar rationale.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto (6356272) in view of Geng (2003/0123713) in further view of Migdal (6,356,263).

In regard to claim 13, Matsumoto teaches a means for assigning texture information to a three-dimensional shape constituent element by carrying out a weighted mean process according to the area of a three-dimensional shape constituent element projected on each object image information on the basis of object image information corresponding to the related label number and the object image information corresponding to a predetermined number of label numbers including that related label number. (Col 7, lines 24-32) Although Matsumoto does not explicitly suggest seeking

overlapped images covered by each triangle within overlapped areas for pixel blending, it would have been obvious to one of ordinary skill in the art at the time the present invention was made to utilize the texture processing of Matsumoto for the pixel blending as claimed because texture processing requires seeking of overlapped images covered by each triangle within overlapped areas. Matsumoto further teaches the image information (color, density or luminance) of this a projected portion is subjected to a weighted mean process to result in the texture information. (Col 7, lines 45-47) Further, Matsumoto teaches the means for assigning texture information to the three-dimensional shape constituent element obtains the area projected on the object image information for each three-dimensional shape constituent element, and uses the obtained area as the weighting factor in carrying out the weighted mean process. For the texture information of the three-dimensional shape constituent element, the portion of the three-dimensional shape constituent element projected on the object image information is obtained. The image information (color, density or luminance) of this projected portion is subjected to a weighted means process to result in the texture information. (Col 8, lines 36-47) Although Matsumoto does not explicitly teach calculating pixel weight average to mapping area corresponding to each triangle, it would have been obvious to one of ordinary skill in the art at the time the present invention was made to utilize the method as claimed in Matsumoto because using an amount of image area obtained as a weighting factor in the averaging process would also be applied for calculating pixel weight average to mapping area. Lastly neither Matsumoto nor Geng explicitly teaches calculating distances of vertices of each of the

triangles within the overlapped areas to nearest edges of corresponding mesh. However, this is what Migdal (6,356,263) teaches. Migdal teaches non-symmetric criteria included using a distance function that would calculate a distance from one of the vertices. (Col 7, lines 30-34). Furthermore, Migdal teaches a procedure that determines whether the square of the distance between the vertices' coordinates of the edge to be subdivided is greater than a threshold value. (Col 7, lines 55-58). It would have been obvious to one of ordinary skill in the art at the time the present invention was made to combine the teachings of distance calculation between a vertex and an edge of a triangle taught by Migdal into the system of Matsumoto utilizing the generic model of Geng because the use of the distance function taught by Migdal provides computational and processing efficiencies such as saving of memory space and processor resources. (Col 8, lines 8-10) and by calculating these distances a more accurate 3-D model would be realized.

Conclusion

Any inquiry concerning this communication or earlier communications from examiner should be directed to Kevin K Xu whose telephone number is 571-272-7747. The examiner can normally be reached on Monday-Friday from 9 AM – 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571) 272-7782.

Information regarding the status of an application may be obtained from Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EB) at 866-217-9197 (toll-free).

K. X.

Kevin Xu

2/27/2006

Mark Zimmerman

MARK ZIMMERMAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600